Average Hadron Multiplicities in Hadronic e^+e^- Annihilation Events

Table 38.1: Average hadron multiplicities per hadronic e^+e^- annihilation event at $\sqrt{s} = 10$, 29–35, 91, and 130–200 GeV. The rates given include decay products from resonances with $c\tau < 10$ cm, and include the corresponding anti-particle state. Correlations of the systemaic uncertainties were considered for the calculation of the averages. (Updated July 2001 by O. Biebel.)

Particle	$\sqrt{s} = 10$ GeV	$\sqrt{s} = 29$–35 GeV	$\sqrt{s} = 91$ GeV	$\sqrt{s} = 130$–200 GeV
Pseudoscalar mesons:				
π^+	6.6 ± 0.2	10.3 ± 0.4	16.99 ± 0.27	21.24 ± 0.39
π^0	3.2 ± 0.3	5.83 ± 0.28	9.42 ± 0.32	
K^+	0.90 ± 0.04	1.48 ± 0.09	2.242 ± 0.063	2.81 ± 0.19
K^0	0.91 ± 0.05	1.48 ± 0.07	2.049 ± 0.026	2.10 ± 0.12
η	0.20 ± 0.04	0.61 ± 0.07	0.946 ± 0.075	
$\eta\prime(958)$	0.03 ± 0.01	0.26 ± 0.10	0.152 ± 0.020	
D^+	0.16 ± 0.03	0.17 ± 0.03	0.175 ± 0.016	
D^0	0.37 ± 0.06	0.45 ± 0.07	0.454 ± 0.030	
D_s^+	0.13 ± 0.02	0.45 ± 0.20[a]	0.131 ± 0.021	
B^+, B_d^0	—	—	0.165 ± 0.026[b]	
B_s^0	—	—	0.057 ± 0.013[b]	
Scalar mesons:				
$f_0(980)$	0.024 ± 0.006	0.05 ± 0.02[c]	0.146 ± 0.012	
$a_0(980)^\pm$	—	—	0.27 ± 0.11[d]	
Vector mesons:				
$\rho(770)^0$	0.35 ± 0.04	0.81 ± 0.08	1.231 ± 0.098	
$\rho(770)^\pm$	—	—	2.40 ± 0.43[d]	
$\omega(782)$	0.30 ± 0.08	—	1.08 ± 0.12	
$K^*(892)^+$	0.27 ± 0.03	0.64 ± 0.05	0.715 ± 0.059	
$K^*(892)^0$	0.29 ± 0.03	0.56 ± 0.06	0.738 ± 0.024	
$\phi(1020)$	0.044 ± 0.003	0.085 ± 0.011	0.0963 ± 0.0032	
$D^*(2010)^+$	0.22 ± 0.04	0.43 ± 0.07	0.1973 ± 0.0057[e]	
$D^*(2007)^0$	0.23 ± 0.06	0.27 ± 0.11	—	
$D_s^*(2112)^+$	—	—	0.101 ± 0.048[f]	
B^* [g]	—	—	0.288 ± 0.026	
$J/\psi(1S)$	—	—	0.0052 ± 0.0004[h]	
$\psi(2S)$	—	—	0.0023 ± 0.0004[h]	
$\Upsilon(1S)$	—	—	0.00014 ± 0.00007[h]	
Pseudovector mesons:				
$\chi_{c1}(3510)$	—	—	0.0041 ± 0.0011[h]	
Tensor mesons:				
$f_2(1270)$	0.09 ± 0.02	0.14 ± 0.04	0.166 ± 0.020	
$f_2'(1525)$	—	—	0.012 ± 0.006	
$K_2^*(1430)^+$	—	0.09 ± 0.03	—	
$K_2^*(1430)^0$	—	0.12 ± 0.06	0.084 ± 0.022[h]	
B^{**} [i]	—	—	0.118 ± 0.024	
Baryons:				
p	0.253 ± 0.016	0.640 ± 0.050	1.048 ± 0.045	1.41 ± 0.18
Λ	0.080 ± 0.007	0.205 ± 0.010	0.3915 ± 0.0065	0.39 ± 0.03
Σ^0	0.023 ± 0.008	—	0.076 ± 0.011	
Σ^-	—	—	0.081 ± 0.010	
Σ^+	—	—	0.107 ± 0.011	
$\Sigma^\pm$	—	—	0.174 ± 0.009	
Ξ^-	0.0059 ± 0.0007	0.0176 ± 0.0027	0.0258 ± 0.0010	
$\Delta(1232)^{++}$	0.040 ± 0.010	—	0.085 ± 0.014	
$\Sigma(1385)^-$	0.006 ± 0.002	0.017 ± 0.004	0.0240 ± 0.0017	
$\Sigma(1385)^+$	0.005 ± 0.001	0.017 ± 0.004	0.0239 ± 0.0015	
$\Sigma(1385)^\pm$	0.0106 ± 0.0020	0.033 ± 0.008	0.0462 ± 0.0028	
$\Xi(1530)^0$	0.0015 ± 0.0006	—	0.0055 ± 0.0005	
Ω^-	0.0007 ± 0.0004	0.014 ± 0.007	0.0016 ± 0.0003	
Λ_c^+	0.100 ± 0.030[j]	0.110 ± 0.050	0.078 ± 0.017	
Λ_b^0	—	—	0.031 ± 0.016	
$\Sigma_c^{++}, \Sigma_c^0$	0.014 ± 0.007	—	—	
$\Lambda(1520)$	0.008 ± 0.002	—	0.0222 ± 0.0027	

Notes for Table 38.1:

(*a*) B($D_s \to \eta\pi,\ \eta'\pi$) was used (RPP1994).
(*b*) The Standard Model B($Z \to b\bar{b}$) = 0.217 was used.
(*c*) $x_p = p/p_{\rm beam} > 0.1$ only.
(*d*) Both charge states.
(*e*) B($D^*(2010)^+ \to D^0\pi^+$) × B($D^0 \to K^-\pi^+$) has been used (RPP2000).
(*f*) B($D_s^* \to D_S^+\gamma$), B($D_s^+ \to \phi\pi^+$), B($\phi \to K^+K^-$) have been used (RPP1998).
(*g*) Any charge state (*i.e.*, B_d^*, B_u^*, or B_s^*).
(*h*) B($Z \to$ hadrons) = 0.699 was used (RPP1994).
(*i*) Any charge state (*i.e.*, B_d^{**}, B_u^{**}, or B_s^{**}).
(*j*) The value was derived from the cross section of $\Lambda_c^+ \to p\pi K$, assuming the branching fraction to be $(3.2 \pm 0.7)\%$ (RPP1992).

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